RADIATION HAZARD

Agent Information:

Radiological agents are used in health care, industry, energy production and as warfare agents, measured by the number of atoms disintegrating per unit time. A disintegrating atom can emit a beta particle, an alpha particle, a gamma ray, or some combination.

Signs and Symptoms:

Exposure to radiation can cause two kinds of health effects. Deterministic effects are observable health effects that occur soon after receipt of large doses. These may include hair loss, skin burns, nausea or death. Stochastic effects are long-term effects, such as cancer. The radiation dose determines the severity of a deterministic effect and the probability of a stochastic effect in conjunction with the type of emission – usually man-made.

Route of Exposure:

Alpha particles, beta particles, gamma rays and x-rays affect tissue in different ways. Alpha particles disrupt more molecules in a shorter distance than gamma rays. As radiation moves through the body, it dislodges electrons from atoms, disrupting molecules and depositing energy. The energy the radiation deposits in tissue is called the dose or the absorbed dose. A person can receive an external dose by standing near a gamma or high-energy beta-emitting source. A person can receive an internal dose by ingesting or inhaling radioactive material.

The external exposure stops when the person leaves the area of the source. The internal exposure continues until the radioactive material is flushed from the body by natural processes or decays. When a person inhales or ingests a radionuclide, that radionuclide is distributed to different organs and stays there for days, months or years until it decays or is excreted. The radionuclide will deliver a radiation dose over a period of time. The dose that a person receives from the time the nuclide enters the body until it is gone is the committed dose.

Transmission:

Only victims who are contaminated with radioactive particles, either externally or internally, can expose other people to radiation.

Protective Measures and Equipment:

Exposures can be reduced by decontamination, using shielding to protect others, and distancing. Self-protection and decontamination will depend on the type of radiation particle and the type of exposure. If possible, decontaminate patients prior to transport by irrigating wounds distally and laterally and containing runoff water. However, necessary lifesaving medical treatment should precede decontamination or other radiation management procedures. Minimize contamination of vehicles by closing internal compartments, covering floors and using mobile equipment. Wrap patient in at least a double layer of sheeting.

Follow appropriate Body Substance Isolation (BSI) precautions, with use of Personal Protective Equipment (PPE) and personal dosimeters.
Standard Precautions: Hand washing before and after all patient contacts and contact with patient care equipment.
Contact Precautions: Use of gloves, gown and eye protection.
Airborne Precautions: Initiate airborne precautions if environmental exposure contains airborne particles, including wearing masks (fit-tested NIOSH approved N-95 respirator).

Equipment can be decontaminated using soap and water, and 0.5% hypochlorite solution (one part household bleach to 10 parts water) can be used as appropriate or if gear had any visible contamination. Note that bleach may damage some types of firefighter turnout gear (one reason why it should not be used for biological agent response actions). After taking off gear, response workers should shower using copious quantities of soap and water.

Prophylaxis:

Potassium iodide can be an effective radiation countermeasure for radioactive iodine exposure only. Administration of KI is necessary, when ordered to do so by a Public Health Official during a radioiodine emergency. Persons with known iodine sensitivity should not take KI; neither should persons with medical conditions associated with an increased risk of iodine hypersensitivity. Such individuals should be referred to their personal care physicians.

Treatment:

Rapid response to nuclear or radiological terrorism is crucial. Detection and decontamination are very important.

Reporting:

Report suspect cases immediately to the Division of Public Health, Epidemiology Branch: 1-888-295-5156 (24/7 coverage). For additional information, view the CDC website for Emergency Preparedness and Response at: www.bt.cdc.gov.